

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

Please cancel claims 14, 21, 29, and 30 without prejudice and amend claims 15, 17, and 18 as follows.

1. (Previously amended) A method for depositing a layer on a substrate in a process chamber, the method comprising:

supplying a gaseous mixture to the process chamber, the gaseous mixture comprising a silicon-containing gas, a fluorine-containing gas, an oxygen-containing gas, and a nitrogen-containing gas;

providing energy to the gaseous mixture to deposit a nitrogen-containing fluorinated silicate glass layer onto the substrate; and

forming a barrier layer over the nitrogen-containing fluorinated silicate glass layer.

2. (Previously amended) The method of claim 1 wherein the barrier layer comprises at least one of tantalum, tantalum nitride, silicon nitride, and silicon-carbon.

3. (Previously amended) The method of claim 1 further comprising forming a metal layer over the barrier layer.

4. (Original) The method of claim 3 wherein the metal layer comprises copper.

5. (Original) The method of claim 1 wherein the nitrogen-containing gas is selected from the group consisting of N₂, N₂O, NH₃, and NF₃.

6. (Original) The method of claim 1 wherein the silicon-containing gas comprises TEOS, the fluorine-containing gas comprises SiF₄, and the oxygen-containing gas comprises O₂.

7. (Original) The method of claim 1 wherein the gaseous mixture further includes an inert gas.

8. (Original) The method of claim 1 wherein providing energy comprises forming a plasma from the gaseous mixture in the process chamber.

9. (Original) The method of claim 1 wherein a ratio of a flow rate of the nitrogen-containing gas into the process chamber to a total flow rate of the gaseous mixture into the process chamber is less than about 10%.

10. (Original) The method of claim 1 wherein the nitrogen-containing fluorinated silicate glass layer has a nitrogen content of less than about 5 at. %.

11. (Original) The method of claim 10 wherein the nitrogen-containing fluorinated silicate glass layer has a nitrogen content of less than about 1 at. %.

12. (Original) The method of claim 11 wherein the nitrogen-containing fluorinated silicate glass layer has a nitrogen content of less than about 0.1 at. %.

13. (Original) The method of claim 12 wherein the nitrogen-containing fluorinated silicate glass layer has a nitrogen content of about 0.03-0.08 at. %.

14. (Canceled without disclaimer or prejudice)

15. (Currently amended) [The method of claim 14] A method for depositing a layer on a substrate having a barrier layer in a process chamber, the method comprising:

supplying a gaseous mixture to the process chamber, the gaseous mixture comprising a silicon-containing gas, a fluorine-containing gas, an oxygen-containing gas, and a nitrogen-containing gas; and

providing energy to the gaseous mixture to deposit a nitrogen-containing fluorinated silicate glass layer onto the barrier layer;

wherein the barrier layer is formed over a metal layer.

16. (Original) The method of claim 15 wherein the metal layer comprises copper.

17. (Currently amended) The method of claim [14] 15 wherein the barrier layer comprises at least one of silicon-carbon, silicon nitride, tantalum and tantalum nitride.

18. (Currently amended) A method of forming a layer on a substrate in a process chamber, the method comprising:

forming a fluorinated silicate glass layer over the substrate;

forming a patterned photoresist layer over the fluorinated silicate glass layer;
etching the fluorinated silicate glass layer according to the patterned photoresist
layer;

removing the photoresist layer and substantially simultaneously introducing
nitrogen dopants into the fluorinated silicate glass layer by subjecting the photoresist layer and
the fluorinated silicate glass layer to a plasma formed from a nitrogen-containing gas;
wherein the plasma contains no oxygen species.

19. (Original) The method of claim 18 wherein the nitrogen-containing gas is
selected from the group consisting of N₂ and NH₃.

20. (Original) The method of claim 18 wherein the nitrogen-containing gas
comprises at least one of N₂ and NH₃.

21. (Canceled without disclaimer or prejudice)

22. (Original) The method of claim 18 wherein nitrogen dopants are
incorporated into the fluorinated silicate glass layer in a region near a surface of the fluorinated
silicate glass layer which is exposed to the plasma formed from the nitrogen-containing gas.

23. (Original) The method of claim 22 wherein the region near the surface of
the fluorinated silicate glass layer has a nitrogen content of less than about 10 at. %.

24. (Original) The method of claim 23 wherein the region near the surface of
the fluorinated silicate glass layer has a nitrogen content of about 1 to about 5 at. %.

25. (Original) The method of claim 18 further comprising forming a barrier
layer over the nitrogen-containing fluorinated silicate glass layer.

26. (Previously amended) The method of claim 25 wherein the barrier layer
comprises at least one of silicon-carbon, silicon nitride, tantalum and tantalum nitride.

27. (Original) The method of claim 25 further comprising forming a metal
layer over the barrier layer.

28. (Original) The method of claim 27 wherein the metal layer comprises
copper.

29. (Canceled without disclaimer or prejudice pursuant to restriction
requirement)

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30. (Canceled without disclaimer or prejudice pursuant to restriction requirement)